Mr. Michael T. Davis Calculus	Units 1.1, 1.2 & 1.3 Practice Quiz September 9, 2016

Name: Solutions

Directions: Try each problem without your calculator, then use your calculator ONLY IF you feel you have truly tried everything possible without your calculator.

1. Given a line containing the points $(3,-5)$ and $(3,1)$, find an equation of the line.

$m = \frac{-5-1}{3-3} = \frac{-6}{0}$ = undefined Vertical line $x=3$

2. Line A has equation $y+10=\frac{-3}{5}(x-11)$. Line B contains the point $(-10,14)$ and is perpendicular to line A. Determine an equation for line B in general form (standard form).

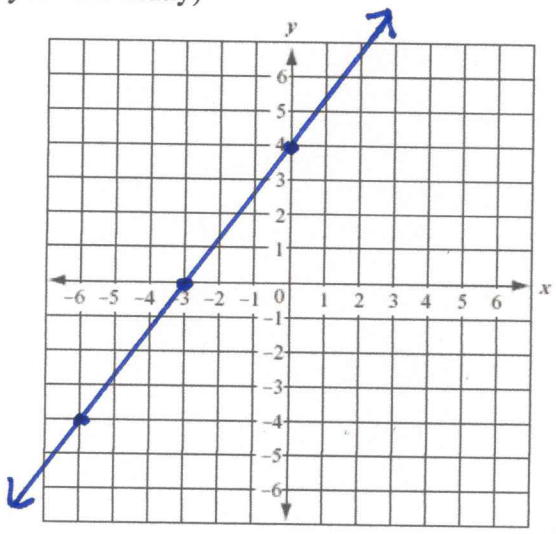
Slope of line B is $m=\frac{5}{3}$ $y-14=\frac{5}{3}(x+10)$ $y=\frac{5}{3}x+\frac{92}{3}$

$y=\frac{5}{3}x+\frac{50}{3}+14$ $-5x+3y=92$

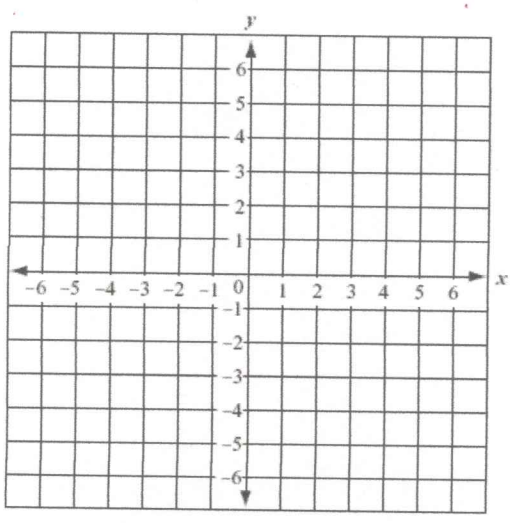
3. Graph $4x-3y=-12$ (plot several points and draw your line neatly)

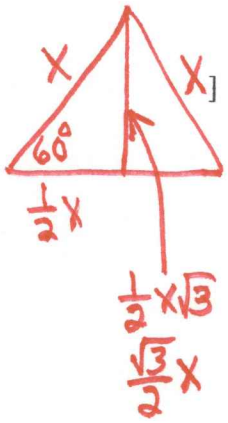
X	Y
0	4
-3	0

(0,4) & (-3,0)



4. A line contains the points plotted below. Write an equation of the line in point-slope form, slope-intercept form, and general form (standard form).





5. Write a formula for the height of an equilateral triangle as a function of its side length, x.

$h(x) = \frac{\sqrt{3}}{2}x$

6. Write a formula for the volume of a sphere as a function of the spere's radius, r.

$V(r) = \frac{4}{3}\pi r^3$

7. Identify the domain and range of the function $f(x) = 9 - x^2$.

Parabola opening down from vertex (0,9)

Domain D: $(-\infty, \infty)$ Range R: $(-\infty, 9)$

8. Identify the domain and range of the function $g(x) = \sqrt{5-x}$.

Half parabola opening to the left or a square root graph

$5 - x \geq 0$ $-x \geq -5$ $x \leq 5$ D: $x \leq 5$ R: $y \geq 0$

9. Identify the domain and range of the function $k(x) = \sqrt{4-x^2}$.

Semicircle D: $[-2, 2]$ R: $[0, 2]$

10. Identify the domain and range of the function $p(x) = \sqrt{-x}$.

Square root graph in quadrant II

D: $(-\infty, 0]$ R: $[0, \infty)$

11. Identify the domain and range of the function $h(x) = \sqrt[3]{x}$.

Cube root graph D: $(-\infty, \infty)$ R: $(-\infty, \infty)$

12. Determine whether the function $f(x) = x^{\frac{1}{3}}$ is even, odd, or neither.

$f(8) = 2$ $f(-8) = -2$ $f(-x) = -f(x)$

f(x) is an odd function

13. Determine whether the function $g(x) = x^{\frac{2}{3}}$ is even, odd, or neither.

$g(8) = 4$ $g(-8) = 4$ $g(-x) = f(x)$

g(x) is an function.

14. Determine whether the function $k(x)=x^4-3x^2$ is even, odd, or neither.

$K(2)=16-12=4 \quad K(-2)=16-12=4 \quad K(-x)=K(x)$

$K(x)$ is an even function

15. Determine whether the function $p(x)=\frac{1}{x}$ is even, odd, or neither.

$P(2)=\frac{1}{2} \quad P(-2)=-\frac{1}{2} \quad P(-x)=-P(x)$

$P(x)$ is an odd function

16. Determine whether the function $m(x)=x^3-3x$ is even, odd, or neither.

$m(2)=8-6=2 \quad m(-2)=-8+6=-2 \quad m(-x)=-m(x)$

$m(x)$ is an odd function

17. Given the piecewise function $f(x)=\begin{cases} x^2-1 \text{ if } x\le 2 \\ 2x-1 \text{ if } x>2 \end{cases}$, determine the following:

a. the value of $f(2)$

$f(2)=2^2-1=3$

b. if the function is continuous at $x=2$

$2^2-1=3 \quad 2(2)-1=3 \quad f(x)$ is continuous at $x=2$

c. the domain of the function

$D: (-\infty, \infty)$

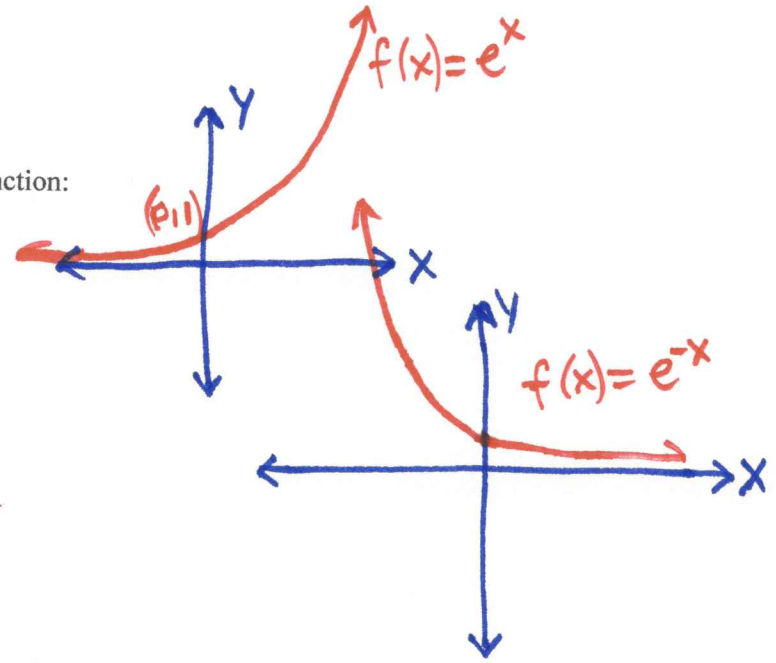
d. the range of the function

$R: [3, \infty)$

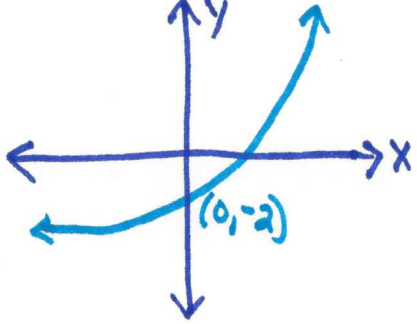
18. Draw an approximate graph of each function:

a. $f(x)=e^x$

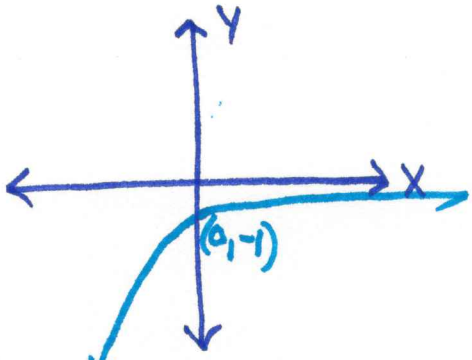
b. $f(x)=e^{-x}$



c. $f(x)=e^x-3$



d. $f(x)=-e^x$



19. Use a graph on your calculator to find the zeros of the function $f(x)=2^x-5$

the zero is the x-intercept $x=2.322$

20. Determine the domain and range of the exponential function $f(x)=2e^x+3$

D: $(-\infty,\infty)$ R: $[3,\infty)$

21. The population of Silver Run in the year 1890 was 6250. Assume the population increased at a rate of 2.75% per year.

a. Estimate the population in 1915.

$P(t)=6250(1+0.0275)^t$ $P(25)=6250(1.0275)^{25}\approx 12,314.76$

$\approx 12,315$

b. Approximate the year when the population reached 50,000.

$50,000=6250(1.0275)^t$ $\ln 8=\ln(1.0275)^t$

$8=(1.0275)^t$ $\ln 8=t\cdot\ln(1.0275)$ $t\approx 76.65$

the year is about 1966 to 1967

22. Determine how much time is required for an investment to double in value if interest is earned at the rate of 6.25% compounded annually.

$2=1\left(1+\frac{0.0625}{12}\right)^t$ $\ln 2=t\ln(1.00521)$

$2=(1.00521)^t$ $t\approx 133.39$ months

$t\approx 11.12$ years

Approximately 11 years and 1 month

23. The number of bacteria in a petri dish culture after t hours is $B(t)=100e^{0.693t}$.

a. What was the initial number of bacterial present?

100 bacteria

b. How many bacteria are present after 6 hours?

$B(6)=100e^{0.693(6)}\approx 6,394$

c. Approximately when will the number of bacteria be 200? In other words, estimate the doubling time of the bacteria.

$200=100e^{0.693t}$ $\ln 2=\ln e^{0.693t}$

$2=e^{0.693t}$ $\ln 2=0.693t$

$t\approx 1$ hour